



Adam Flint, Director of Clean Energy Programs
Hailley Delisle, Campaign Director, Heat Smart Southern Tier

A Program of



Register today at NYNEST.ORG

- **Thursday, October 29, 12:00-12:50pm**
Geothermal Home Case Study with Dailey Electric
- **Thursday, November 12, 12:00-12:50pm**
Air Source Heat Pumps: Technology and Incentives w/Airsource LLC
- **Wednesday, November 18, 7:00-7:50pm**
Clean Heating & Cooling with Heat Pumps & Energy Efficiency
- **Thursday, December 3, 12-12:50pm**
Clean Heat Beneath your Feet with Dailey Geothermal
- **Wednesday, December 9, 12-12:50pm**
Energy Efficiency Virtual Home Tour (Binghamton) with The Insulation Man
- **Wednesday, January 13, 2021, 7-7:50pm**
Clean Heating & Cooling with Heat Pumps & Energy Efficiency
- **Thursday, January 21, 2021, 12-12:50pm**
Air Source Heat Pump Virtual Home Tour (Oxford)

NEST's HeatSmart Southern Tier (HSST) Virtual Webinar Series Schedule



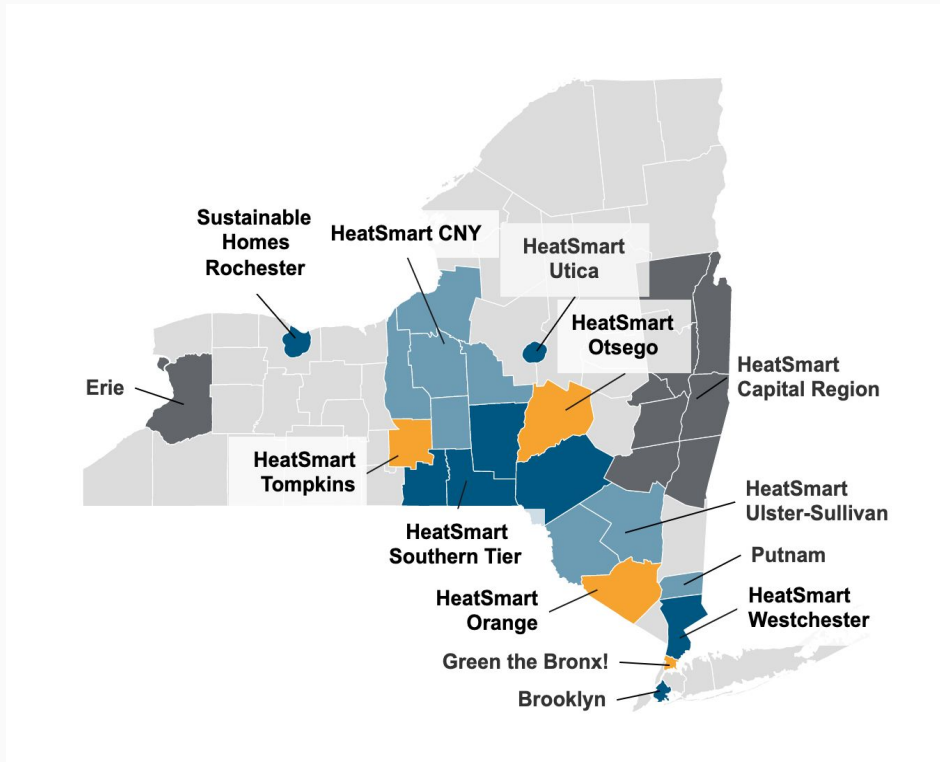
The Network for a Sustainable Tomorrow is a non-profit community-based network of programs working towards social, environmental, and economic justice and equity in our region. NEST catalyzes and convenes new initiatives and partnerships, and does outreach and education to build a stronger and more resilient Southern Tier.



Overview

- **What is Heat Smart Southern Tier?**
- **Why HeatSmart?**
- **Dailey Electric and Geothermal**
- **Case study**
- **Incentives & financing**
- **How to participate**
- **Q&A**

What is HeatSmart Southern Tier?



- HeatSmart Southern Tier (HSST) is a NYSERDA-funded community outreach program that connects you to local heating and cooling and energy efficiency experts who offer the latest clean energy technologies.
- We work to educate the public about sustainable heating and cooling systems through our workshops, webinars and tabling events.

Benefits of Heat Smart Southern Tier

- Reduce energy costs
- Home comfort & safety
- Greenhouse gas emissions
- Community awareness



Where Are We Now?

Main Sources Of Greenhouse Gases in NYS

New York's goal is to reduce these emissions 80% by 2050



TRANSPORTATION
34%



BUILDINGS
32%



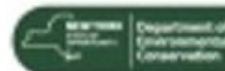
ELECTRICITY
20%




WASTE & OTHER
8%




INDUSTRY
6%



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Heat Smart Southern Tier Program Covers:



- Weatherization
- Heat Pumps
 - Ground Source
 - Air Source
 - Water Heater

HeatSmart Southern Tier's Competitively Selected Partners

Air Source Heat Pumps



D & D

Refrigeration

(Delaware county)

Ground Source Heat Pumps

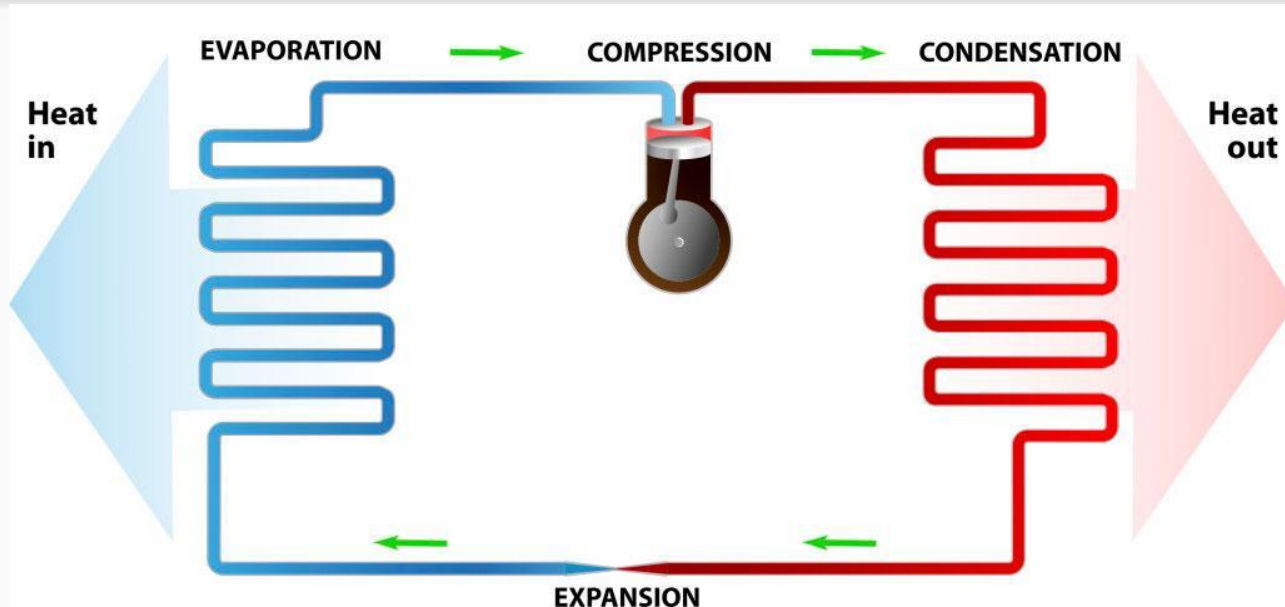
Dailey Geothermal

Home Performance and Efficiency



Dailey Electric and Geothermal

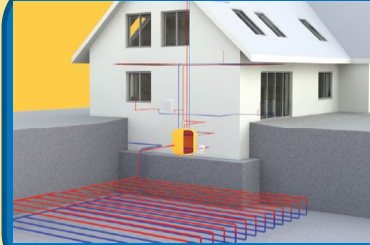
What is a heat pump?



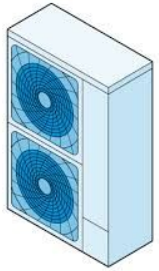
Types of Heat Pumps

Space Heating & Cooling

Hot Water Heating



Ground Source
Heat Pump



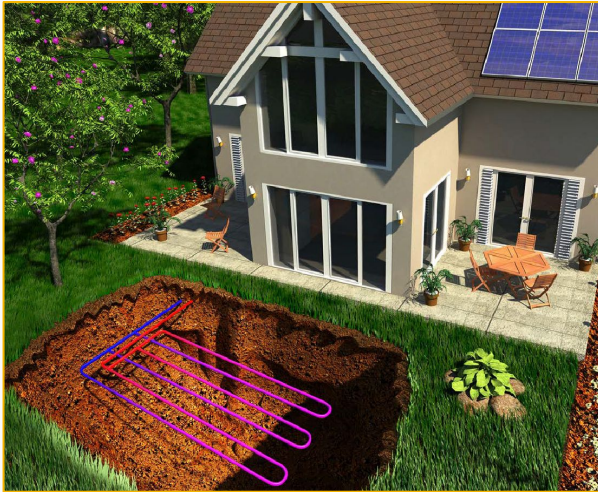
Air Source
Heat Pump



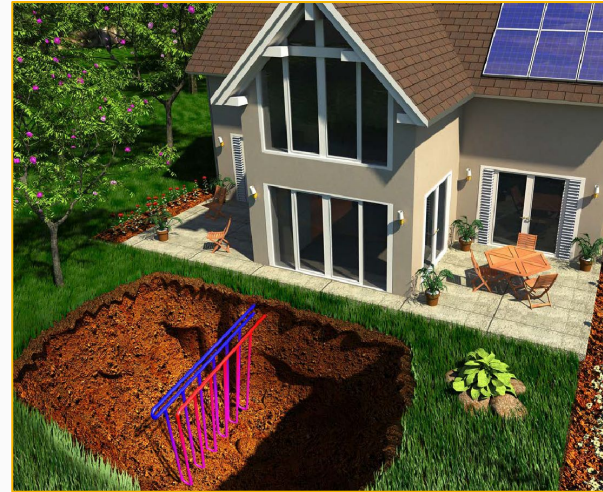
Heat pump
Water Heater

Types of Ground Source Heat Pumps

Closed Loop



Horizontal



Vertical

Ground Source Heat Pump Benefits

- An efficient heating/cooling system
- Long system lifetime
- Eliminate fossil fuels from your home
- Can include domestic hot water



Monger Geothermal Case Study

Dailey Electric, Inc.



BEFORE.....

Load Short Form
Entire House
 Dailey Electric, Inc.

 Job: Bruce Monger
 Date: Dec 13, 2019
 By: Ryan Dailey

140 Sheppard St, Penn Yan, NY 14527 Phone: 315-531-6108 Fax: 315-536-6480 Email: daileyelectricsnc@gmail.com Web: www.daileyelectricsnc.com

Project Information

 For: Bruce Monger
 420 Ridge Rd, Lansing, NY 14882

Design Information

	Htg	Clg	Method	Infiltration	Simplified
Outside db (°F)	3	87	Construction quality	Average	0
Inside db (°F)	68	75	Fireplaces		
Design TD (°F)	65	12			
Daily range	-	M			
Inside humidity (%)	50	50			
Moisture difference (gr/lb)	47	22			

HEATING EQUIPMENT

Make
 Trade
 Model
 AHRI ref
 Efficiency
 Heating input
 Heating output
 Temperature rise
 Actual air flow
 Air flow factor
 Static pressure
 Space thermostat

80 AFUE

0 Btuh

0 Btuh

0 °F

826 cfm

0.019 cfm/Btuh

0 in H2O

COOLING EQUIPMENT

Make
 Trade
 Cond
 Coil
 AHRI ref
 Efficiency
 Sensible cooling
 Latent cooling
 Total cooling
 Actual air flow
 Air flow factor
 Static pressure
 Load sensible heat ratio

0 SEER

0 Btuh

0 Btuh

0 Btuh

826 cfm

0.042 cfm/Btuh

0 in H2O

0.92

ROOM NAME	Area (ft²)	Htg load (Btuh)	Clg load (Btuh)	Htg AVF (cfm)	Clg AVF (cfm)
Room1	240	7183	3927	138	165
Room2	784	17808	7954	342	335
Room3	240	5459	2021	105	85
Room4	144	4215	1843	81	78
Room5	225	8313	3840	160	162
Entire House	1633	42977	19504	826	826
Other equip loads		0	0		
Equip. @ 0.92 RSM			17628		
Latent cooling			1675		
TOTALS	1633	42977	19604	826	826

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

Manual J Heat Loss

42,977 Heat Loss

19,504 Cooling Gain

Vertical loop bore hole 500'



Loop installation prior to grouting



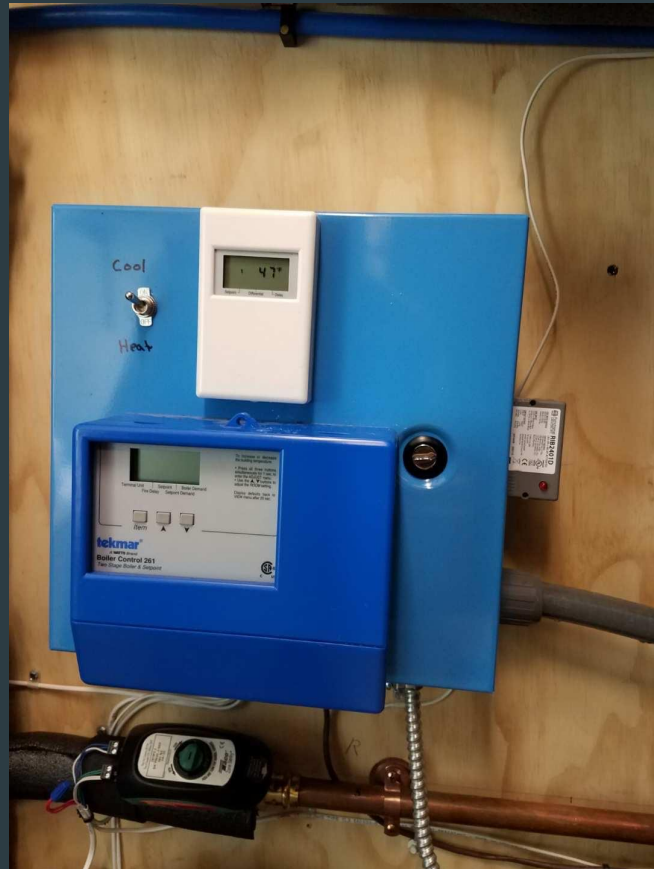
Hiding of loop
pipes -
Custom cover by
homeowner



Old LP fired hot water boiler with Indirect hot water tank



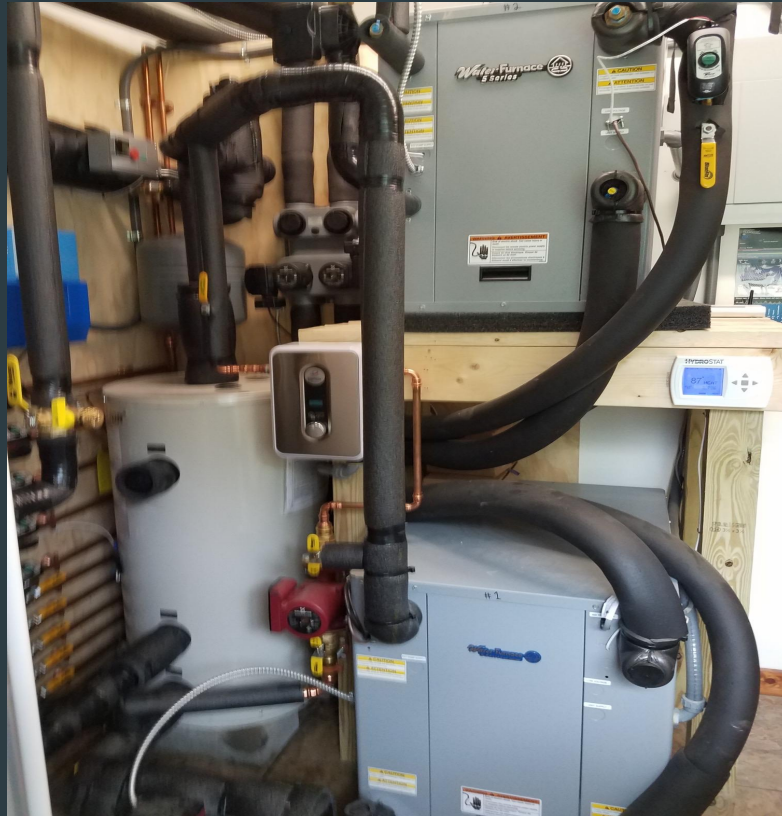
Phoenix Control box



Symphony Monitoring



WF 5 series NEW Optiheat unit with 2 ton NSW for domestic hot water



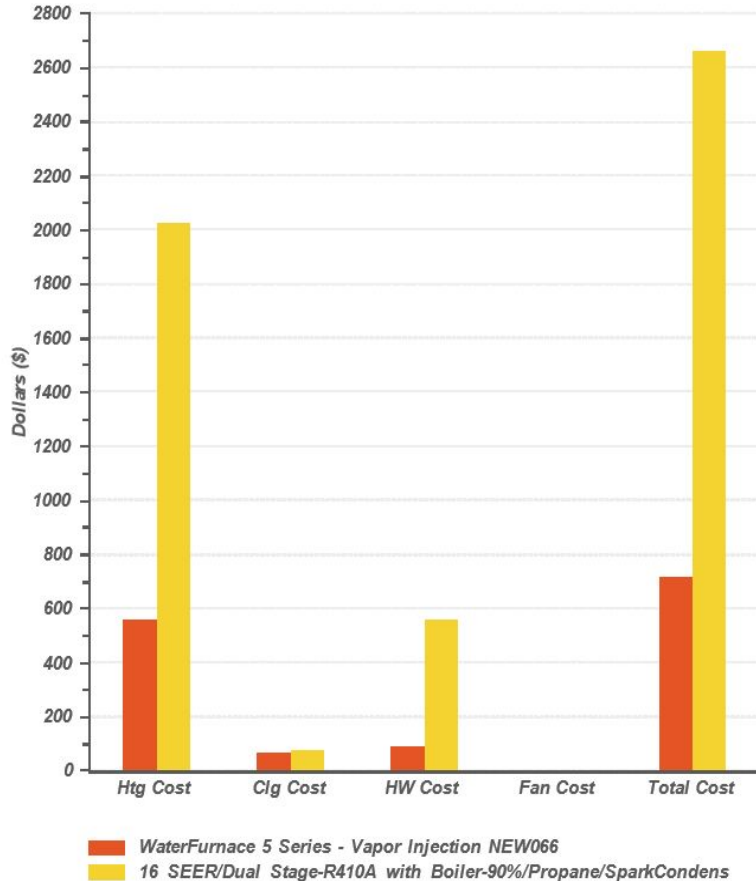
Piping to existing hot water baseboards



MultiAqua console unit and high wall unit



Payback Comparison Vs. Fossil Fuel



Investment Economics



System:	Geo System 1 Best system	Fossil Furnace Base system
	5 Series - Vapor Injection NEW066	16 SEER/Dual Stage-R410A with Boiler-90%/Propane/SparkCondens

Economics Detail

System and Installation Cost:	\$51,275	\$18,000
Incentive / Rebate:	\$27,682	\$3,000
Net System Price:	\$23,593	\$15,000
Expected Fuel Inflation Rate:	5.00%	5.00%

Operating Cost Results

Annual Fuel Cost w/o Inflation:	\$715	\$2,661
Equivalent CO2 (Avg US) [lbs]	9,689	17,482
Equivalent CO2 [Trees/Cars]	24.2 / 0.7	43.7 / 1.3
Installation Costs vs. Fossil Furnace	\$8,593	
First Year Operating Savings vs. Fossil Furnace	\$1,946	
Simple Payback vs. Fossil Furnace	4.41 years	

Investment Analysis

Net Investment Amount:	\$23,593
Net Investment Amount: vs. Fossil Furnace	\$8,593
Annual Fuel Savings: vs. Fossil Furnace	\$1,946
Return on Investment: vs. Fossil Furnace	649%
Internal Rate of Return: vs. Fossil Furnace	27.55%

Lifecycle Cost of Ownership

System Service Life	20 yrs	15 yrs
Replacement Cost %	50 %	100 %
Replacement Loan Rate %	10 %	10 %
20 year Total Lifecycle Costs	\$47,227	\$113,417
20 year Total Lifecycle Costs vs. Fossil Furnace	(\$66,190)	

Ground Source System 1 Performance Summary



5 Series - Vapor Injection NEW066 with Vertical 1 U-Bend - 1.25" PE

WaterFurnace System -

WaterFurnace Series:	5 Series - Vapor Injection
WaterFurnace Unit:	5 Series NEW066
Geo Unit Cooling Run Time:	181 hours
Geo Unit Heating Run Time:	1,131 hours
Hot Water Generation Option:	NSW025 HPWH
Max System Balance Point:	0.0 °F
Avg. System Balance Point:	0.0 °F
Summer Peak Demand:	2.5 kW
Winter Peak Demand:	4.6 kW

Auxiliary Heat -

Auxiliary Heat Type:	Electric - Internal duct heat
Furnace Fuel:	Electric
Auxiliary Heat Required:	0 kW
Optional Emergency Heat Size:	14 kW

GeoThermal Loop System -

Loop Type:	Vertical 1 U-Bend 1.25" PE
Soil Type:	Silt/Clay - Damp
Average Depth:	5.0 ft
Trench/Bore:	2690 ft
Freeze Protection Minimum:	21.0 °F
Max Geo Extreme Temp:	66.5 °F
Average Clg Loop Temp:	56.6 °F
Average Htg Loop Temp:	41.6 °F
Min Geo Extreme Temp:	32.3 °F
Geo Temp Min-Max:	32.0 - 75.0 °F
Deep Earth Temp:	50.0 °F
Surface Swing:	24.3 °F
Ground Lag Time:	38 Days
Soil Conductivity:	0.75
Soil Diffusivity:	0.6

Design Data -

Design Heating Load:	42,977 Btuh
Design Heating Temp Difference:	68.0 °F
Radiant/Fan Coil/Radiator Option:	Radiator 140 °F ELT
Design Cooling Load:	19,604 Btuh
Design Cooling Temperature Difference:	17.0 °F
Hot Water Temperature Setting:	120 °F
Hot Water Users:	3
Continuous Fan:	No
Internal Gains:	7,110 Btuh

Comfort Conditions -

Heating Set Point:	70 °F
Cooling Set Point:	75 °F
Start Cooling Temperature:	75 °F
Weather Location:	SYRACUSE,NY

Heating -

5 Series - Vapor Injection Unit:

Annual Load:	76.1 million Btu
Electrical Use:	6,210 kWh
Average Efficiency:	3.59 COP
% of heating load:	100 %
Annual Cost of Operation:	\$559

Auxiliary Heat: Electric - Internal duct heat:

Electrical Use:	0 kWh
Average Efficiency:	0 %
% of Heating Load:	0 %
Annual Cost of Operation:	\$0

Total Heating Cost: \$559

Cooling -

5 Series - Vapor Injection Unit:

Annual Load:	9.0 million Btu
Electrical Use:	753 kWh
Average Efficiency:	11.93 EER

Total Cooling Operating Cost: \$68

Hot Water -

NSW025 HPWH

Annual Load:	14.6 million Btu
Electrical Use:	979 kWh
Average Efficiency:	4.38 COP
% of HW Load:	100 %

Total Hot Water Operating Cost: \$88

Total Annual Cost: \$715

Energy Consumption Per Year



AFTER.....

Economics, Incentives, and Financing

NYSEG & RGE Incentives (Residential)

Technology	Description		Eligibility Requirements
Cold Climate Air Source Heat Pump	Partial Load Heating Rebate	\$500 per outdoor unit <i>(-\$100 per outdoor unit to contractor)</i>	All ASHPs must be NEEP-listed Cold Climate Air Source Heat Pumps
	Full Load Heating Rebate	\$1,000 per 10,000 Btu/h of maximum capacity at 5°F <i>(-\$500 per project to contractor)</i>	Partial Load: Must be mini-split heat pump Full Load: Can be central or mini-split heat pump, must be sized to 90-120% of building heat load
Ground Source Heat Pump	Full Load Heating Rebate	\$1,500 per 10,000 Btu/h of heating capacity (certified by AHRI) <i>(-\$500 per project to contractor)</i>	GSHP must be ENERGY STAR certified and meet ENERGY STAR Tier 3 requirements and be sized to 90-120% of building heat load. This incentive only covers closed-loop systems. Speak with your installer for more information about incentives for open-loop systems.
Water Heating	Heat Pump Water Heater	\$700 per unit	Must be ENERGY STAR certified and under 120 gallons in capacity
	GSHP Desuperheater	\$100 per unit	Desuperheaters are installed as an optional component to eligible GSHP systems to offset some of your hot water load. Speak with your installer to learn more about desuperheater integration.
	Ground-Source Water Heater	\$900 per unit	This incentive is for ground source heat pump systems dedicated to providing 100% of domestic hot water load. The GSHP must be ENERGY STAR Tier 3 Certified.

***Custom incentives and incentives for commercial-scale systems are also available based on the expected annual energy savings (\$80/MMBtu). Speak with your installer to learn more.*

Heat Pump Tax Credits

	Air Source Heat Pump	Ground Source Heat Pump	Heat Pump Water Heater
Federal Tax Credit	----	26%	\$300 until Dec 31, 2020

Financing

Provider	Loan Product Name	Description
NYSERDA*	Smart Energy Loan	Up to \$25,000; terms of 5, 10, and 15 years; 3.49 <u>or</u> 6.99% interest
	On-Bill Recovery Loan	Up to \$25,000; terms of 5, 10, and 15 years; 3.49 <u>or</u> 6.99% interest; paid on utility bill
ASHP/GSHP Manufacturer Financing (E.g. Synchrony, EnerBank)		Unsecured loans with dealer fees (can be terms of up to 20 years)
Local Banks (e.g. Home Equity, consumer loans)		Dependent on bank
Property Assessed Clean Energy (PACE) - Commercial/Non-profit only		Repaid through property tax and tied to the property; Up to 100% of cost, 4%-5.75%, terms of 5-20 years

Enabling LMI Participation: Income-eligible programs

Assisted Home Performance with Energy Star Energy Efficiency/Weatherization

Provides those who apply with a discount of **50% of project costs**

- Limit of **\$5,000** for single-family
- Limit of **\$10,000** for 2-4 unit multi-family
- Eligibility expanded up to 120% AM through Dec. 31
- Includes heat pumps as of Nov 5

Household Size	Income Limit
1	\$58,856
2	\$78,288
3	\$96,720
4	\$115,128
5	\$133,560
6	\$151,968

(Income levels subject to change)

Enabling LMI participation: Income-eligible programs

EmPower NY

Energy Efficiency/Weatherization

- Available to homeowners that are under 60% of state median (HEAP/low-income utility rate code eligible) that pay utility bills
- FREE assessment and efficiency improvements
- Max award increased to \$10k until Dec 31.
- Includes heat pumps as of Nov 5

Household Size	Income Limit
1	\$29,928
2	\$39,144
3	\$48,360
4	\$57,564
5	\$66,780
6	\$75,984

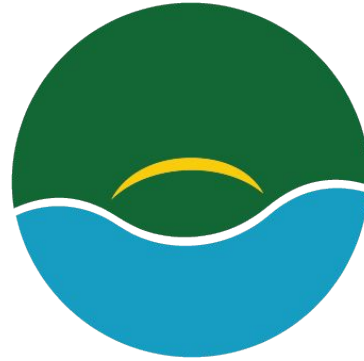
(Income levels subject to change)

What's the Process For Participating?

1. Sign up for a home energy assessment (and/or)
2. Sign up for site assessment from HSST installer(s)
3. Receive a quote for energy improvements
4. Sign contract for desired systems (if any)
5. Apply for incentives/financing (if applicable)
6. Complete installation work

Questions?

Thank You!



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